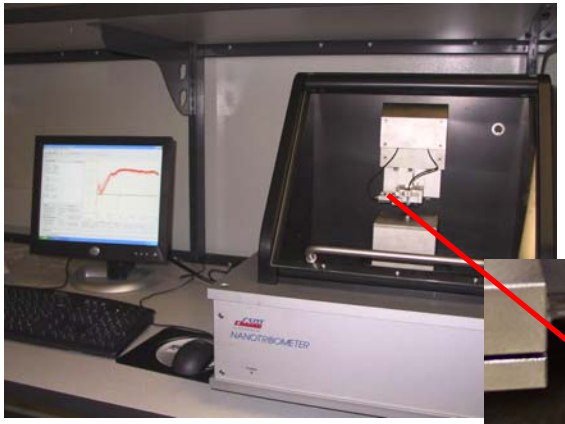
Acquisition of a Nano-Tribometer and Imaging Tool for Research and Education in Nanostructured Thin Films and Devices

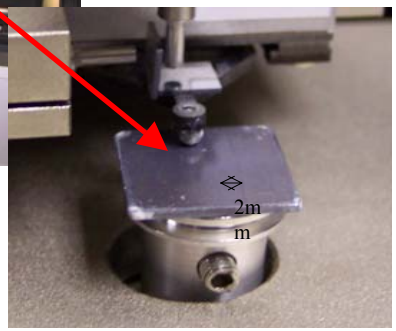
Andrei V. Stanishevsky, University of Alabama at Birmingham

DMR-0314643

New materials characterization techique at UAB: This award funded CSM Nanotribomter and Fogale Micro-surf-3D optical profilometer. The instrumentation was installed on 01/05/2004.

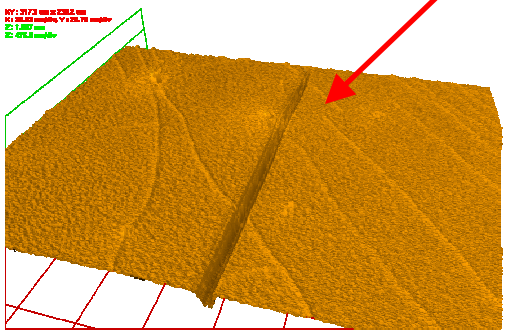


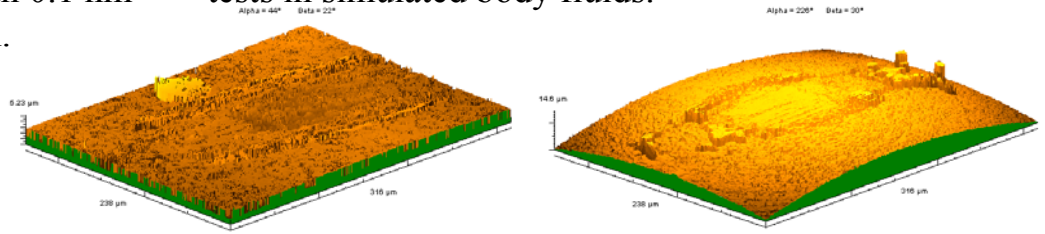
Both tools are located on the same workbench for easy sample transfer.



Microsurf-3D provides non-contact surface topography analysis with 0.1 nm z-resolution.

The **CSM Nanotribometer** has been optimized for surgical implant micromotion tests in simulated body fluids.





Microsurf-3D generated images of wear tracks on the $CaTiO_3$–based bioceramic coating on Ti6Al4V (left) after the test with uncoated Ti6Al4V 2mm-sphere (right) after 50,000 cycles of linear displacement with 200 μm amplitude.

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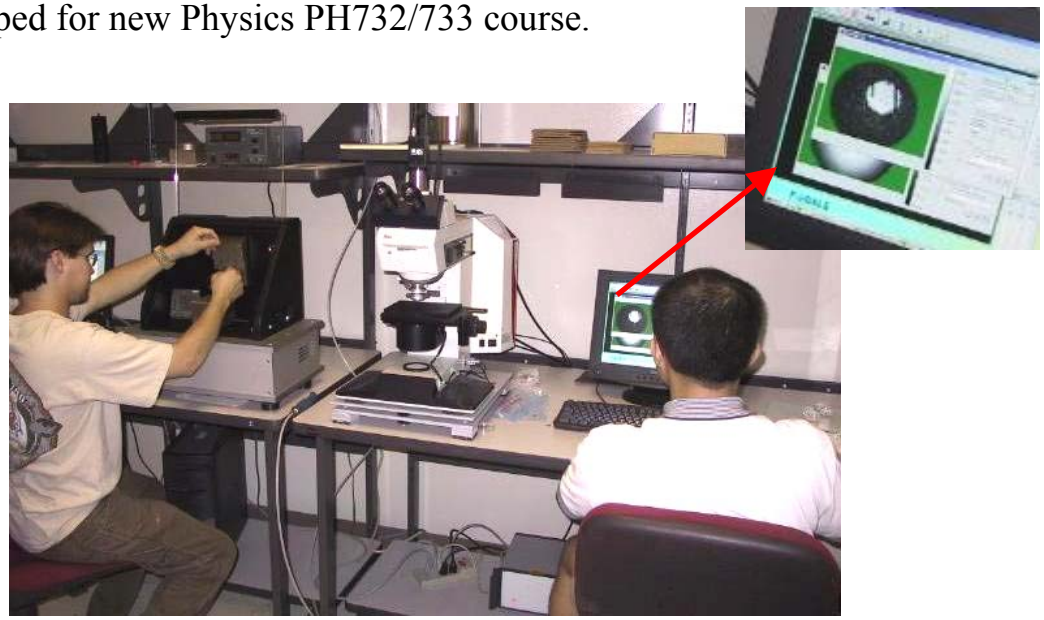
Research: The equipment is **used by 6 groups** for microscopic wear studies of biomaterials and implant interfaces (Vohra, Stanishevsky, Camata - Physics, Lemons – School of Dentistry, Eberhardt – BME, Chawla - MSE). Two research articles submitted.

Education: Six graduate (Holliday, Liang, Rast (Physics), Advincula, Hill (BME), Carlisle (MSE)) and **four undergraduate** (Rose, Khanijoun (BME), Nunez (Physics), Schaefers (Chemistry)) students have been trained to use the equipment. One lab coursework developed for new Physics PH732/733 course.

REU 2004 student Artesia Rose (Spelman College, BME) prepares sol-gel bioceramic sample for tribological tests.



Team work: Sam Holliday (MS thesis research) installs a sample for micromotion wear test while Qi Liang (PhD thesis research) analyzes wear tracks of NanoCrystalline Diamond - coated TMJ implant parts.